

**ENVIRONMENTAL SCIENCES  
(EVS2016)**

**Time Allotted : 2½ hrs**

**Full Marks : 60**

*Figures out of the right margin indicate full marks.*

*Candidates are required to answer Group A and  
any 4 (four) from Group B to E, taking one from each group.*

*Candidates are required to give answer in their own words as far as practicable.*

**Group – A**

1. Answer any twelve:

**12 × 1 = 12**

*Choose the correct alternative for the following*

- (i) Which is not an example of green solvent?  
(a) Ethyl Lactate (b) Oleic acid  
(c) Bioethanol (d) Toluene
- (ii) Chernobyl disaster occurred in the year  
(a) 1980 (b) 1982 (c) 1984 (d) 1986
- (iii) Which is an example of inexhaustible energy source?  
(a) Coal (b) Petroleum (c) Biomass (d) Mineral
- (iv) Which one is not a greenhouse gas  
(a) CO<sub>2</sub> (b) O<sub>2</sub> (c) O<sub>3</sub> (d) H<sub>2</sub>O vapour
- (v) The main product of photochemical smog is  
(a) PAN (b) O<sub>3</sub> (c) H<sub>2</sub>SO<sub>4</sub> (d) NH<sub>4</sub>Cl
- (vi) The ozone hole in antarctica is due to  
(a) CFC (b) CH<sub>4</sub> (c) O<sub>3</sub> (d) NO<sub>2</sub>
- (vii) The BOD reaction gets completed in  
(a) 45 minutes (b) 20 hours (c) 2 days (d) Never gets completed
- (viii) The disinfection of water by chlorine is due to the formation of  
(a) Chlorine radical (b) Dissolved oxygen  
(c) Nascent oxygen (d) Calcium metal
- (ix) Earth worm is an important component in the disposal method called  
(a) Incineration (b) Sanitary landfill  
(c) Composting (d) Open dumping
- (x) Dioxin a carcinogen may be a by-product during the disposal method  
(a) Window composting (b) Incineration  
(c) Sanitary landfill (d) Encapsulation

Fill in the blanks with the correct word

- (xi) Bhopal gas tragedy occurred due to leakage of \_\_\_\_\_ gas.
- (xii) Greenhouse gases absorb \_\_\_\_\_ radiation.
- (xiii) In stratosphere the temperature is \_\_\_\_\_ with increase of altitude.
- (xiv) In surface water treatment, a coagulant will be highly effective if it has \_\_\_\_\_ charge.
- (xv) The noise level which is painful to a human being is above \_\_\_\_\_.

### Group - B

- 2. (a) What is resource? Briefly discuss renewable and non-renewable resources providing suitable examples. [[CO6](Remember/LOCQ)]
  - (b) What is maximum sustainable yield? Prove that maximum sustainable yield following logistic growth of population is  $(dN/dt)_{\max} = rK/4$ , the terms have their usual meaning. [[CO5](Apply/IOCQ)]
  - (c) Write a note on sustainable development? [[CO6](Remember/LOCQ)]
- (1 + 3) + (1 + 4) + 3 = 12**
- 3. (a) What is the main shortcoming of exponential model of population growth? How this shortcoming has been overcome using logistic model of population growth? [[CO5](Remember/LOCQ)]
  - (b) Why renewable resources must be employed instead of non renewable resources for sustainability? [[CO4](Remember/LOCQ)]
  - (c) What are the main characteristics of a green solvent? [[CO6](Remember/LOCQ)]
  - (d) What do you mean by environmental impact? [[CO2](Apply/IOCQ)]
- (2 + 2) + 3 + 3 + 2 = 12**

### Group - C

- 4. (a) What is atmosphere? What are the major regions of atmosphere? [[CO1](Remember/LOCQ)]
  - (b) What is PAN? Using a schematic diagram describe PAN formation. [[CO3](Remember/LOCQ)]
  - (c) Write short note on catalytic converter. [[CO6](Apply/IOCQ)]
  - (d) Deduce the formula of CFC-113. [[CO3](Remember/LOCQ)]
- (1 + 2) + (1 + 3) + 3 + 2 = 12**
- 5. (a) What do you mean by primary and secondary pollutant? Among the carbon dioxide (CO<sub>2</sub>) and tropospheric ozone (O<sub>3</sub>) which one act as a secondary pollutant and why? [[CO3](Apply/IOCQ)]
  - (b) How did ozone hole in the Antarctica region form? [[CO3](Remember/LOCQ)]
  - (c) What are the differences between sulphurous smog and photochemical smog? [[CO3](Remember/LOCQ)]
  - (d) Why tropospheric lapse rate is reversed to that of stratospheric lapse rate? [[CO3](Apply/IOCQ)]
- (2 + 2) + 3 + 3 + 2 = 12**

## Group - D

6. (a) What is eutrophication? How do you control eutrophication? *[[CO1](Remember/LOCQ)]*  
 (b) Define Biological Oxygen Demand. Write expression of BOD<sub>5</sub> in a five day BOD test. What is the necessity to dilute the waste water sample in the test? *[[CO2](Remember/LOCQ)]*  
 (c) What do you mean by hardness of water? Why it is required to remove hardness from water before using in biller and laundries? *[[CO4](Remember/LOCQ)]*  
**(2 + 2) + (1 + 1 + 2) + (2 + 2) = 12**
7. (a) Explain the harmful effects of excess nutrient load in water bodies. What is the recommended maximum TDS value for drinking water? *[[CO1](Remember/LOCQ)]*  
 (b) Prove that  $BOD_t = C_0(1 - e^{-kt})$  for a BOD reaction, where all the terms have their usual significance. Write the relation between the rate constant  $k$  and temperature of a BOD reaction. *[[CO4](Remember/LOCQ)]*  
 (c) Write a flowchart to show the steps involved in surface water treatment. What is the purpose of tertiary treatment? *[[CO2](Remember/LOCQ)]*  
**4 + 4 + (3 + 1) = 12**

## Group - E

8. (a) What are the advantages of recycling? Discuss how some valuable products can be obtained by recycling of solid waste materials. *[[CO4](Remember/LOCQ)]*  
 (b) How can noise pollution be controlled at the source? What are the different equipment are used to measure noise. *[[CO5](Remember/LOCQ)]*  
 (c) Write the advantage and disadvantage of modern sanitary landfill. *[[CO5](Remember/LOCQ)]*  
 (b) Noise in an area is measured as 95 dBA for 1 hour, 90 dBA for 3 hours, 100 dBA for 30minutes and 75 dBA for 3 hours. The permissible noise exposure duration of 100 dBA is 1 hour, 95 dBA is 2 hours, 90 dBA is 4 hours and 75 dBA is any time. Find out whether the permissible limit has exceeded or not and also state if the condition is good for the health of a worker or not. *[[CO5](Apply/IOCQ)]*  
**(2 + 2) + (2 + 1) + 2 + (2 + 1) = 12**
9. (a) Classify Municipal solid waste based on source providing suitable example. *[[CO4](Remember/LOCQ)]*  
 (b) Classify traffic noise mentioning different scale involved in measuring the noise level. *[[CO5](Remember/LOCQ)]*  
 (c) Calculate the intensity of 140dB sound. Is the sound tolerable to human ear? Justify your answer. *[[CO6](Apply/IOCQ)]*  
 (d) List some of the measures adopted to control land pollution? *[[CO4](Remember/LOCQ)]*  
**4 + 3 + 3 + 2 = 12**

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Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	77	23	0

